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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HUNG, YUBIN

ART UNIT PAPER NUMBER

2625

DATE MAILED: 02/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/777,950

Applicant(s)

SPITZER ET AL.

Examiner

Yubin Hung

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-8, 10, 14-16, 19, 22, 24, 26, 28, 30 and 42-48 is/are allowed.
- 6) ☒ Claim(s) 9, 11-13, 17-18, 20-21, 23, 25, 27, 29, 31-32, and 35-41 is/are rejected.
- 7) ☒ Claim(s) 33 and 34 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
 - The following acronyms/terms should be spelled out the first time they are used:
 - RF (P. 9, line 1)
 - P-LMS (P. 10, line 17)
 - P_{do}-LMS (P. 12, line 9)
 - P-RGC (P. 13, line 18)
 - P_{do-a}-LMS (P. 24, line 6)
 - M-opponent (P. 28, line 7)
 - M-RGC (P. 29, line 15)
 - CSR (P. 30, line 3)
 - P. 11, line 17: Include the referenced Fig. 1 of *Dahari and Spitzer* in the drawings as prior art
 - P. 16, line 9: "62" should have been "64"
 - P. 19, line 10: "9 off-center cells" should have been "8 off-center cells"
 - P. 20, line 2: "106" should have been "116"

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9,11-13, 17-18, 20-21, 23, 25, 27, 29, 35-38, 40-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 9 recites the limitation "said double-opponent surround response" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. Claim 11, being dependent on claim 9, is similarly rejected.

5. Claims 12, 18 and 20 recite the limitation "said do-remote response" in their respective lines 1-2. There is insufficient antecedent basis for this limitation in the claim. Claim 13, being dependent on claim 12, is similarly rejected.

(Note: This rejection can be overcome by changing "do-remote signal" in line 17 and "do-remote signals" in lines 21-22 of claim 1 to read "do-remote response" and "do-remote responses," respectively. Hereinafter, for examination purpose claims 12, 13, 18 and 20 are interpreted as if these changes have been made to claim 1.)

6. Claim 17 recites the limitation "said yellow double-opponent response" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim. Claims 20, 21, 23, 25, 27, being dependent on claim 17, are similarly rejected.

7. Claim 29 recites the limitation "said new double-opponent cell responses" in line 2 and "new opponent cell responses" in lines 2-3. There is insufficient antecedent basis for these limitations in the claim.

(Note: Hereinafter, for examination purpose "said new double-opponent cell responses" and "new opponent cell responses" will be interpreted as "said corrected double-opponent responses" and "new opponent responses.")

8. Claim 35 recites the limitation "achromatic intensity contrast" in lines 2-3. There is insufficient antecedent basis for these limitations in the claim. Claims 36-38 and 41, being dependent on claim 35, are similarly rejected.

(Note: Hereinafter, for examination purpose "achromatic intensity contrast" will be interpreted as "achromatic contrast.")

9. Claim 40 recites the limitation "an opponent center response" in lines 1-2. There is insufficient antecedent basis for these limitations in the claim.

(Note: Hereinafter, for examination purpose "an opponent center response" will be interpreted as "an adapted opponent center response.")

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 31, 32, 35, 36, 39 are rejected under 35 U.S.C. 102(b) as being anticipated by "Spatiotemporal Adaptation Model for Retinal Ganglion Cells," *Journal of the Optical Society of America*, Vol. 13, No. 3, March 1996, pp. 419-435 by R. Dahari and H. Spitzer (hereinafter referred to as Dahari et al.).

11. Regarding claim 31, Dahari et al discloses

- providing an image that has an intensity value at each of the plurality of pixels [Fig. 1: $G_s(t)$]
- obtaining an adapted opponent center response using a plurality of said pixel intensity values [Fig. 1: the boxes labeled "dynamical adaptive filter," " $G_b(t)\alpha+\beta$," "Naka-Rushton," resp., and $R_c(t)$; P. 421, Col. 1: Eq. (6)]
- at each pixel, correcting the achromatic contrast using said adapted opponent center response [Fig. 1: $R(t)$; P. 421, Col. 2 : Eq. (10)]

12. Regarding claim 32, Dahari et al further discloses

- calculating an opponent center response [Fig. 1: $G(t)$]
- providing a center adaptation factor [Fig. 1: $\sigma(t)$]

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- combining said opponent center response and said center adaptation factor [P. 421, Col. 1: Eq. (6)]

13. Regarding claim 35, Dahari et al. further discloses

- obtaining an adapted opponent surround response [Fig. 1 : $R_s(t)$]
- said step of correcting for achromatic intensity contrast includes subtracting said adapted opponent surround response from said adapted opponent center response [Fig. 1 : $R(t)$; P. 421, Col. 2 : Eq. (10)]

14. Claim 36 is similarly analyzed and rejected as per claim 35.

15. Regarding claim 39, Dahari et al. further discloses

At each pixel:

- multiplying the intensity spectrum by a spectral response function, thereby providing a spectral product, and integrating said spectral product [Fig. 1; P. 420, Col. 2: Eqs. (2), (3)]

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 40, 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahari et al. as applied to claims 31, 32, 35, 36, 39 above, further in view of Markandey et al. (US 5,500,904).

18. Regarding claim 40, Dahari et al. discloses everything except for the following, which Markandey et al. teaches:

- convolving each said pixel intensity value with a center spatial weight function [Col. 16, lines 5-18. Note that Gaussian is a spatial, decaying weight function.]

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Dahari et al. by convolving the pixels with a center spatial weight function such as the Gaussian as taught by Markandey et al. in order to smooth the image before further processing.

19. Claim 41 is similarly analyzed and rejected as per claim 40.

Allowable Subject Matter

20. Claims 9, 11-13, 17-18, 20-21, 23, 25, 27, 29 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

21. Claims 33, 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

22. Claims 37 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims as well as rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action..

23. Claims 42-48 are allowed.

24. The following is a statement of reasons for the indication of allowable subject matter:

25. Regarding claim 1, similarly claim 42 (which deals with achromatic contrast), the prior art of record fails to teach or suggest, alone or in combination, a color contrast correcting method comprising, along with other recited limitations:

- computing a red, a green and a blue on-center filtered opponent response, based on said center and surround responses
- computing a red, a green and a yellow off-center opponent and filtered opponent response based on said center and surround responses
- computing a red, a green and a blue double-opponent response and a corresponding filtered double-opponent response based on said on-center and off-center filtered opponent responses

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- computing a red, a green and a blue do-remote signal based on a set of responses selected from the group consisting of said on-center filtered opponent responses and said filtered double-opponent responses; and
- for each pixel: correcting each of said red, green, and blue double-opponent responses for color contrast using respectively said red, green and blue do-remote signals, thereby producing corrected red, green and blue double opponent responses.

The closest prior art of Spitzer (US 5,771,312) discloses a color image correcting method that provides red, green, blue images, computes their respective center and surround responses and subtracts each surround response from the appropriate center response to produce on-center opponent responses. [See claims 1 and 12.] However, it does not expressly teach the limitations recited above. Moreover, while David Hubel discusses color opponency and double-opponency (in terms of neural basis of color constancy) in chapter 8 of his 1995 book *Eye, Brain, and Vision* (published by W.H. Freeman & Co.), it does not teach how they are used to correct color contrast. Neither teaches correcting double-opponent responses for contrast using do-remote signals.

26. Regarding claim 33, and similarly claim 37, the prior art of record fails to teach or suggest, alone or in combination, an achromatic contrast adjusting method comprising, along with other recited limitations:

- Said adaptation factor includes a remote center adaptation term

The closest prior art of Dahari et al. discloses a contrast-adjusting method that

provides a center adaptation factor when calculating an adapted opponent center response for contrast adjustment (as per analysis for claim 32). However, this center adaptation factor does not include a remote center adaptation term.

Conclusion

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Waxman et al. (US 5,555,324) – Discloses a method and apparatus that uses center-surround shunt processors to transform input images
- Rotgold et al., "Role of Remote Adaptation in Perceived Subjective Color," J. Optical Society of America, Vol. 14, No.6, June 1997, pp. 1223-1230 – Discusses how light adaptation to illumination presented peripherally changes the subjective color
- Yee et al., "Spatiotemporal Sensitivity and Visual Attention for Efficient Rendering of Dynamic Environments," ACM Tran. On Graphics, Vol. 20, No. 1, Jan. 2001, pp. 39-65 – Presents a global illumination computing method that takes advantage of the limitations of the human visual system
- Bouzerdoun, "A Hierarchical Model for Early Visual Processing," SPIE Proc. Human Vision, Visual Processing, and Digital Display, V, Feb. 1994, pp. 10-17 – Presents a hierarchical model for visual processing and discusses its applicability to image processing

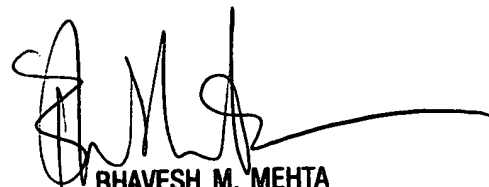
Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (703) 305-1896. The examiner can normally be reached on 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Patent Examiner
Feb. 5, 2004


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